Acta vet. scand. 2001, *42,* 365-375.

Diagnoses and Treatments in Health-Classified Fattening Herds Rearing Pigs All In – All Out

By *M. Heinonen*[1,3], *P. Hämeenoja*[2], *H. Saloniemi*[3] and *V. Tuovinen*[4]

Department of Clinical Veterinary Sciences, Faculty of Veterinary Medicine, [1]University of Helsinki, Saarentaus, [2]Suomen Rehu, [3]Department of Clinical Veterinary Sciences, Faculty of Veterinary Medicine, University of Helsinki, [4]Lihakunta, Kuopio, Finland.

Heinonen M, Hämeenoja P, Saloniemi H, Tuovinen V: Diagnoses and treatments in health-classified fattening herds rearing pigs all in – all out. Acta vet. scand. 2001, 42, 365-375. – This study describes diseases encountered, medications used and veterinary involvement in all in – all out finishing herds belonging to one pork production system. The finishing herds had a particular management and housing regime. The pigs originated from health classified farrowing units. Information on 207442 pigs was collected from 595 log books. Altogether 91% of the pigs received no treatments. Four percent of the batches of pigs were given antimicrobial mass medications. The local veterinarian visited the herds on average 2.6 times during the finishing period and made the diagnoses in more than half of the cases. At least one pig was affected with arthritis or tail biting in more than half of the batches, whereas locomotory diseases were recorded in one third of the batches. All other diagnoses were encountered in 1%-13% of the batches. Only a few pigs were treated individually in the affected groups. Antimicrobial drugs were given to 8% and other medicines to 0.7% of the pigs. The diagnosis was missing at least for one pig in 29% of the batches and the information about the medicine use in 8% of the treatments was missing. The study shows that it is possible to rear finishing pigs with only a small proportion of the animals needing treatments. The need of mass medications was low, because infectious diseases affecting the whole herd were uncommon. The recommendations for antimicrobial use given by the authorities had been followed quite well. The farmers and the veterinarians should be educated in order to realise the importance of proper record keeping.

medications; antibiotic policy; antimicrobials; control; diseases; pork; production; LSO 2000.

Introduction

Antimicrobial drugs are used in food animals as performance-enhancers, prophylactically to prevent diseases or therapeutically (*Blaha* 1996, *Debeuckelaere & Remy* 1996). The usage of antimicrobials has potential adverse effects for the consumer and the population. Abundant use of antibiotics in animals leads to the development of resistant bacteria, which may be passed to humans (*Espinasse* 1993, *Witte* 1998). Further, residues of antibiotics may still be present in the meat of treated animals (*Van Dresser & Wilcke* 1989, *Debeuckelaere & Remy* 1996).

In industrialised countries, the safety and quality of food is increasingly becoming an issue of concern for the consumer (*Blaha* 1999). Regulatory authorities reduce the risks by monitoring residues at slaughter (*Walton* 1983), requiring proper testing of medicines prior to authorisation and by developing recommendations for antibiotic use. One of the important factors influencing the probability of antimicro-

bial residue occurrence in animal products is the extent of their use (*Van Dresser & Wilcke* 1989). Intensification of production may lead to loss of attention to individual animals and to the increased possibility of the spread of disease (*Noordhuizen & Frankena* 1999). It is increasingly necessary to adopt new approaches to food safety and pork quality (*Blaha* 1999). The pork industry has developed different kinds of quality programs. One way to describe the quality of pork production could be to collect information about medications used, the proportion of pigs needing treatments and how herd health is controlled. Some studies have identified the antimicrobials used in the various phases of swine production based on production, sales and trade information (*Espinasse* 1993, *Björnerot et al.* 1996). However, this kind of data gives little information about how, where, when and why antimicrobials are used in swine production (*Dunlop et al.* 1998a). Only limited information is available about the most common diseases and the medications in different production systems, especially as far as finishing units are concerned (*Elbers et al.* 1990, *Elbers et al.* 1992, *Blocks et al.* 1994).

It has been possible to establish national policies for use of veterinary antimicrobials, especially in Scandinavia. In Finland, the Ministry of Agriculture and Forestry published general antimicrobial policy in 1996 (*Anon.* 1996a) together with recommendations for use to treat specific diseases (*Anon.* 1996b). In Sweden, guidelines were published in 1990 (*Holmgren et al.* 1990) and in Denmark in 1997 (*Pedersen* 1997). In 1998, the British Veterinary Association published general guidelines on the use of antimicrobials (*Baker et al.* 1998). In 1999, a new set of 'global principles' on the responsible use of antibiotics in animals was announced by the World Veterinary Association, the International Federation of Agricultural Producers and the World Federation of the Animal Health Industry (*Anon.* 1999). These guidelines have led veterinarians to reconsider their therapeutic routines.

The role of the pork producer is changing from just rearing pigs to being an indispensable part of the food production chain supplying a needed product (*Blaha* 1999). The swine industry should continue to invest in the maintenance of healthy pig populations aiming to reduce the need for medical treatment (*Dunlop et al.* 1998b). In Finland a health class and management system in pork production, LSO 2000 system, has been developed (*Tuovinen et al.* 1997b). The main idea is to produce non-medicated meat. The farmers and the veterinarians are encouraged not to leave diseased pigs untreated, but to treat them individually and to give them an identity to ensure that treated pigs can be refound. Veterinarians play a major role in ensuring responsible and prudent antimicrobial use (*Dunlop et al.* 1998b) and regular farm visits are an essential part of that control. Further, the swine practitioner needs to support pork producers to provide pigs with quality that meet the demands of the whole chain up to the consumer (*Blaha* 1997).

The objectives of the study were to describe the diagnoses recorded, the medications used and the veterinary involvement in controlling the health and the treatments in the LSO 2000 finishing herds. These herds were controlled to conform certain management and housing requirements. They reared batches of feeder pigs originating from health classified farrowing herds.

Materials and methods

The data for the study was collected between March 1996 and December 1997 from the farmers' log books of all in – all out finishing units rearing batches of minimal disease feeder pigs in Finland.

The piglet producing herds

The farrowing units producing the feeder pigs were certified to be free from major swine pathogens including sarcoptic mange, *Mycoplasma hyopneumoniae,* progressive atrophic rhinitis and swine dysentery (*Tuovinen et al.* 1997b). The health status of these farrowing herds was examined by the local veterinarians clinically at least 4 times per year. Bacteriology, serology and/or pathology were used to confirm the diagnosis of clinical signs of the above mentioned diseases. The feedback from the finishing units buying piglets from these farrowing units was constantly used in assessing the disease status of the farrowing units. In addition, Finland is known to be free from some other infectious pig diseases such as swine fever, swine vesicular disease, transmissible gastroenteritis, swine influenza, Aujeszky´s disease and PRRS (*Anon.* 1998a). Also the incidence of salmonella in livestock has been extremely low in Finland, because of an effective salmonella control program *(Anon.* 1998a, *Anon.* 1998b). The feeder pigs had been treated with anthelmintics in the farrowing units approximately one week before transport to the finishing units, which occurred at the average weight of 25 kg. They were also of proven genetic quality (crosses of Landrace and Yorkshire). Usually the feeder pigs were collected from 10-15 farrowing herds in order to make one finishing batch. The feeder pigs were delivered to the pens of the finishing units according to the herd of origin.

The finishing herds

The finishing farms had been classified according to the requirements in the LSO 2000 quality chain (*Tuovinen et al.* 1997b). These herds were certified to have certain housing and management conditions, which were examined at least every 18 months (Table 1). For example, the effective environmental temperature was calculated. The owners were required to provide the feeder pigs with an effective environmental temperature of at least 22-23 °C for one week after the arrival. After that it could be lowered gradually according to the size of the pigs. No routine mass medications (=oral treatment for the whole unit or for a part of the pigs) or antimicrobial feed additives were allowed. In Finland medicines are sold to farmers only by veterinarians or by prescription from pharmacies (*Anon.* 1998b). The owners of the finishing units and the veterinarians were advised to treat sick pigs individually and ear mark them with an individual number. In case of widespread infection within the unit, mass medication was allowed, but it had to be reported to the animal health service in the slaughterhouse. The owners of the finishing units were advised to ask the local veterinarian to check the herds clinically at least twice during the finishing period, the first one being within one week after arrival of the feeder pigs. The average time in the finishing unit for the study population was 96 days.

The recordings in the finishing herds

The ear number of the pigs diagnosed to have different diseases, the date, the disease code, the code of the person initiating the treatment (owner or the local veterinarian), the duration of the treatments and all medications were recorded in the log book on the day of the treatment by the persons treating the pigs. The pig disease codes of Agricultural Data Processing Centre (Suomen Maatalouden Laskentakeskus) were used in recording the diseases. The codes were combined according to Table 2. The owners of the finishing units were advised to send the log books to the slaughter plant together with the slaughter pigs. All log books which were returned were included in the study.

Table 1. Management and housing requirements of Finnish finishing pig units classified as LSO 2000 units. A single deviation of <10% from a single measurement was allowed.

Variable	Requirement
General	
Number of pigs per compartment[a]	≤400 (300)
Hospital pens for sick pigs	5 places per 100 pigs
Bedding provided	Yes
Loading of the slaughter pigs	No electrical prod allowed
Contract with the local veterinarian	Yes
Adequate biosecurity measures[b]	Yes
Housing and management	Examination every 18 months
Feeding	
Feeding only approved feedstuffs[c]	Yes
Trough space, no floor feeding	≥32 cm/pig
Water	
Free access to water from a nipple	Yes, 1.0-1.5 litres / minute
Location of the water nipples	Manure area
Water quality examined	Every three years
Pens	
Total pen area per pig	≥0.9 m^2
Solid floor per pig	≥0.6 m^2
The slot width in the slatted floor	18-23 mm
Fence between the pens	No electrical fence allowed
Air quality	
Airflow at the height of the pigs	≤0.2 meters per second
Ammonia	≤10 ppm
CO_2	≤3000 ppm
H_2S	≤0.3 ppm
Humidity	50-80%
Extra heat provided	Yes
Effective environmental temp.[d]	12-22°C
Light	
Light intensity	≥100 lux
Use of lights	10-16 hours / day

[a] Compartment is a room housing pigs. Several compartments can be situated on a compound, but in that case a maximum of 300 pigs per compartment is allowed.
[b] Proper loading conditions of slaughter pigs and protective clothing and boots for visitors used.
[c] Approved by the quality officer of the slaughterhouse: Diet based on Finnish grain (>70%), no antimicrobial feed additives, salmonella control and the use of substances causing bad taste (e.g. fish products), technical problems (e.g. some plant oils), ethical problems (e.g. blood), safety risks (e.g. waste food) denied or restricted.
[d] Effective environmental temperature = Temperature measured + floor effect (-4°C concrete, -5.5°C steel, +0°C wood, +0.5°C plastic) + effect of bedding (+0 - +5°C) – airflow x 15.

Table 2. Some of the pig disease codes of Agricultural Data Processing Centre were combined for the evaluation of the data as shown below.

Combined diagnoses used in the study	Diagnoses used from the pig disease list of Agricultural Data Processing Centre
Digestive, infective	Diarrhoea, E. coli diarrhoea, bloody diarrhoea, swine dysentery
Digestive, other	Gastric ulcers, other disorder in stomach, intestinal volvulus, prolapsed rectum, other digestive disorder
Locomotory	Bursitis, nutritional muscular dystrophy, osteochondrosis, porcine stress syndrome, other locomotory disorder, fracture , disorder in claws, laminitis
Nervous	Meningitis, other disease with symptoms of nervous system
Respiratory	Enzootic pneumoniae, actinobacillus pleuropneumoniae, atrophic rhinitis, other pneumonia, inclusion body rhinitis
Skin	Skin infection, trauma, sarcoptic mange, other skin disease
Other	General bacterial infection, systemic disease, microangiopathy, other cardiovascular disorder, anaemia, aggressiveness, surgical action, accident, other preventive medication given for reasons not mentioned

Results

Log books and overall medical treatments

A total of 595 log books were available for analysis. They consisted of 207442 pigs, which was 79% of all the pigs reared on LSO 2000 finishing farms during the time period studied. The pigs were reared on 152 finishing farms and the median size of one batch was 301 (30-1000) pigs, (minimum-maximum).

Altogether 9% (n=18107) of the pigs were either mass-medicated or treated individually. A median of 5% of the pigs per batch were treated. No animals were medicated in 30 batches (5%). A veterinarian visited the herds on average 2.6 times (sd=1.0) during the finishing period. The diagnose was made by the veterinarian in 58% of the cases. The time of the treatment after arrival varied according to Table 3, i.e. Glässer syndrome, infective digestive disorders and oedema disease were diagnosed within a few weeks after arrival, whereas arthritis, locomotory disorders, skin disease, and erysipelas were common 3-4 weeks after arrival. Later tail biting, respiratory diseases and other digestive disorders induced the medical treatments. The animals were medically treated for a median of 5 days (Table 3).

Mass medications

Antimicrobial mass medication was given to 23 batches (4%). In 16 batches all animals and in 7 batches part of the animals (median 34% of the pigs, range 18-78%) were mass-medicated: respiratory disorder in 10 batches (2%), infective digestive disorder in 9 batches (2%), other digestive disorder in 2 batches (0.3%) and oedema disease in one batch (0.2%). The diagnosis had not been recorded in one mass-medicated batch (0.2%).

Individual treatments

Arthritis and tail biting were the most common diseases diagnosed in the finishing units, when the percentage of batches with at least one affected pig was studied (Table 4). The median percentage of pigs treated for different diseases in the affected batches after excluding the mass-medicated batches ranged from 0.3% to 3% (Table 4).

Table 3. The time of occurrence and the duration of different treatments (both individual treatments and mass medications) in 595 batches of feeder pigs in all in – all out LSO 2000 finishing herds (median, minimum-maximum).

Diagnosis	Number of cases[a]	Time of the treatment		Duration of the treatment	
		Days from arrival	N	Number of days	N
Tail biting	4983	37 (0-99)	4947	3 (0-14)	4197
Arthritis	3764	27 (0-109)	3698	3 (0-12)	3549
Respiratory	3027	45 (1-107)	2770	7 (1-21)	3022
Digestive, infective	3025	14 (2-73)	3025	7 (1-10)	2753
Digestive, other	1039	39 (3-89)	1051	6 (0-10)	1047
Locomotory	669	23 (0-99)	667	3 (0-14)	636
Oedema	495	17 (3-42)	111	5 (1-5)	490
Erysipelas	224	28 (0-96)	223	1 (1-5)	212
Skin	216	29 (0-99)	206	1 (0-7)	207
Glässer	215	7 (1-57)	194	1 (0-5)	210
Unknown disease	86	26 (0-96)	82	3 (1-21)	74
Abscess	42	17 (1-63)	38	3 (1-8)	35
Nervous	18	38 (3-77)	18	3 (0-7)	18
Other	172	40 (0-105)	136	3 (0-17)	139
Information missing	1055	31 (0-103)	1033	4 (0-14)	713
Any disease		27 (0-109)		5 (0-21)	

[a]Some pigs counted more than once because of >1 treatment periods per pig or >1 disease code per treatment recorded

Table 4. The diagnoses used with individual treatments in all in – all out LSO 2000 finishing units. The percentage of batches affected represents the batches where at least one diagnosis in question was recorded in the log book (altogether 572 batches, mass-medicated batches excluded). The percentage of pigs treated describes the median percentage (minimum - maximum) of pigs having different diagnoses in the affected batches.

Diagnosis	% of batches affected	Median % of pigs treated in the affected batches	% of all pigs reared treated individually[a]
Tail biting	69	3 (0.1-100)	2
Arthritis	70	2 (0.1-27)	2
Respiratory	13	0.5 (0.1-14)	0.2
Digestive, infective	12	0.7 (0.2-8)	0.1
Digestive, other	6	0.5 (0.2-6)	0.05
Locomotory	34	0.7 (0.2-19)	0.3
Oedema	1	1 (0.4-11)	0.05
Erysipelas	4	2 (0.2-17)	0.1
Skin	8	0.4 (0.2-11)	0.07
Glässer	11	0.5 (0.1-9)	0.08
Unknown disease	11	0.4 (0.1-2)	0.04
Abscess	5	0.3 (0.1-2)	0.02
Nervous	3	0.4 (0.2-0.7)	0.01
Other	11	0.4 (0.1-4)	0.07
Information missing	29	3 (0.1-17)	0.5
Any disease	95	5 (0.2-100)	6[a]

[a]Some pigs counted more than once because of >1 treatment period per pig or >1 disease code per treatment recorded

Table 5. The use of antimicrobial drugs in all in – all out LSO 2000 finishing units. The table presents the diagnosis, the number of diagnoses (mass medication[a] or individual treatment) and the percentages of drugs for treating the diseased pigs (595 batches).

Diagnosis	N of diagnoses[b]	% of animals having the diagnosis treated with: ß-lactam antibiotics[c]	Tetracycline	Trimethoprim-sulpha	Lincosamides, macrolides and pleuromutilines[d]	Enrofloxacin	Several antimicrobials simultaneously	Only other treatments than antimicrobials used	Information missing about the treatments
Tail biting	4983	73	13	2	0	0	1	0	11
Arthritis	3764	58	24	1	2	0	2	1	12
Respiratory	3027	3	36[a]	0	59[a]	0	0	1	3
Digestive and infective	3023	0	2	1	73[a]	0	23[a]	0	1
Digestive, other	1039	3	2	3	82[a]	2	4	1	1
Locomotory	669	46	18	1	5	0	0	17	12
Oedema	495	0	0	85[a]	0	0	0	0	14
Erysipelas	224	88	0	0	0	0	0	0	11
Glässer	215	32	6	21	0	0	13	0	27
Miscellaneouse	536	36	15	2	2	1	0	33	10
Information missing	1055	41	15	5	2	17[a]	0	5	14
TOTAL	19030	37	16	4	27	1	4	3	8

[a] 88-100% of these treatments have been given as mass medications, all other treatments have been individual treatments
[b] Some pigs counted more than once because of >1 treatment periods per pig or >1 disease code per treatment recorded
[c] Penicillin and ampicillin
[d] Lincomycin, spiramycin, tiamulin and tylosin
[e] Miscellaneous = Skin, abscess, nervous, unknown disease, other

The medicines used

Altogether 8% (n=17906) of the pigs were treated with antimicrobials either individually or with mass medication. The use of ß-lactam antibiotics (mostly penicillin), tetracycline and the group of lincosamides, macrolides and pleuromutilins were commonly used drugs. The use of trimethoprim-sulpha, enrofloxacin and combinations of several antimicrobials was less common (Table 5). Other medicines than antimicrobials were used for 1450 pigs (0.7% of all pigs): Anti-inflammatory drugs were given for 574 pigs (=3% of treated animals), vitamin E plus selenium for 372 pigs (2% of treated animals), corticosteroids for 338 pigs (=2% of treated animals), antiparasitic drugs for 106 pigs (=0.6% of treated animals) and other medicines for 102 pigs (=0.6% of treated animals).

Discussion

In the present study, 9% of the pigs were medically treated during the fattening period. A majority of the treated pigs were given antimicrobials (8% of all animals) and 4% of the batches were mass-medicated. A few years earlier 19% of the fatteners were medicated and 11% of the batches were given mass medications in the same region (*Heinonen et al.* 1997). At that time the housing and management of the finishing units were not controlled. However the

feeder pigs purchased belonged to the same defined health status in both trials (*Tuovinen et al.* 1997b). Apparently the introduction of certain production standards and veterinary inspections improved the health status in a positive way. Considerable variation has been found in the use of veterinary drugs between farms. For example, group medication was given in the Netherlands to 69% of the farms because of intestinal disorders and to 84% of the farms because of respiratory disorders (*Elbers* 1991).

The fact that the veterinarians made 58% of the diagnoses must not contradict to the general animal welfare, because the veterinarians visited the farms at strategic time points and certainly at times of accumulated health disturbances. The existence of a strong veterinarian-client relationship is important for proper use of antimicrobials. For example in Canada, only 23% of larger operations participated in herd health programs and only about half of the producers that experienced a disease outbreak in growing-finishing pigs actually consulted a veterinarian (*Dunlop et al.* 1998b). Information about a specific pig unit, the competence of the managerial staff to apply the antibiotic as prescribed and the previous history of the use of different antibiotics on a farm can only be acquired by a frequent veterinary presence on the farm (*Walton* 1984). In the present study, the health and the treatments of the pigs were monitored during the monthly visits of the local veterinarians. It is notable that no antimicrobial feed additives were used. The response to them is greater in young pigs and in unhygienic housing (*Kunesh & Zimmerman* 1994). Withdrawal of feed additives during the fattening period probably meant quite little in the herds studied, because of the high general health status of the herds. Elsewhere, it is very common to use antimicrobial feed additives also for growing/finishing pigs. For example, in Great Britain it was found that 29% of farmers gave them to finishers and 57% to growers (*Pearce* 1999). The abundant use of antimicrobial feed additives has led to the recommendation that the use of antibiotics as feed additive or for the preventive control of diseases should be prohibited (*Debeuckelaere & Remy* 1996).

The total avoidance of antimicrobial use is not the ultimate goal, but their scientifically founded use according to the principle 1) tailored to the correct diagnosis and 2) as little as possible, but always the amount that is needed (*Blaha* 1996). In the present study, the most common diagnoses differed from those made in other systems. The otherwise common infective diseases such as respiratory and digestive disorders affecting the whole finishing batch and needing mass medications were quite uncommon. The pigs could be regarded as individuals and the use of mass medications changed to individual treatments. Animals should be treated individually whenever possible. It is important to get a therapeutic level of drug to the ill pig, rather than to its healthy contemporaries. If the sick pigs are treated individually early in the course of the disease the pathogen load to the healthy pen-mates will be reduced, thereby decreasing the need of further treatments. Another aspect is animal welfare. Individual treatments ensure that each sick pig will be sufficiently medicated.

There are various methods to minimise the need of antimicrobials in swine finishing units. Apart from improving the health of the pigs these methods generally improve animal welfare. They include for example all in – all out production, health matching, diminishing the number of source herds by various methods, tracking and eliminating the infection sources and controlling housing and management (*Tuovinen et al.* 1997c). The all in – all out method effectively interrupts the accumulation of microbes in the piggery. With health matched feeder pigs the pathogen load can be reduced.

In the present study most of the batches originated from 10-15 farrowing units. A decreasing number of farrowing herds supplying the fattening herds has been found to be associated with an increased percentage of drug-free finishing periods (*Elbers et al.* 1990). Infected farrowing units can be tracked by the help of the finishing units. Sorting the pigs by source herd to the finishing unit pens helps tracking of disease sources and helps to treat infectious diseases effectively without the need to treat the whole batch.

The publication of the national antibiotic policy (*Anon.* 1996a) and recommendations for treatment (*Anon.* 1996b) published in Finland are likely to have affected the selection of the antimicrobials used. Most of the treatments followed the general policy. However, for example the use of several antimicrobials simultaneously in the case of Glässer syndrome or infective digestive disorders was not according to the recommendations. This paper describes the drug use only in one region. There may be great differences between different regions and veterinarians with regard to the prescriptions (*Holmgren et al.* 1990). Therefore, the results obtained in a region ought not to be generalised to cover a whole country.

Considerably high percentage, 79% of the log books were returned. In the present study the figure should have been higher, because in a quality chain one would have expected better involvement of the farmers. However, no missing log books were requested. The study shows that it is difficult to effectuate control systems employing all farmers. The batches representing the missing log books were, however, not likely to differ from the ones that participated in the study by having more disease problems, because the finishing herds had paid a high price for their minimal disease feeder pigs. Based on our field experience, the farmers were likely to report the disease problems to the slaughterhouse in order to claim the dealer about the health of the animals, especially if there were a lot of treatments. Also, the reporting of the treatments did not affect the price of the meat.

An obvious limitation in the study was the fact that some of the recordings in the log books were incomplete. The diagnosis was missing at least for one pig in 29% of the herds representing 0.5% of all pigs reared. Similarly, the information about drug use in 8% of the treatments was missing. One would anticipate better record keeping for the farmers and veterinarians of the herds in a quality chain. More education is needed for the farmers and the veterinarians about the matter. They should realise that it is of utmost importance to be able to prove the customers all medicine used in pig production.

To conclude, it was possible to rear finishing pigs with only a small proportion of the animals needing treatments. Individual treatments could be used principally, because infectious diseases affecting the whole herd were uncommon. The recommendations for antimicrobial use given by the authorities as part of the national antibiotic policy had been followed quite well in the herds studied. However, the farmers and the veterinarians should be educated in order to realise the importance of proper record keeping in proving the customers all medicine use of the herds if needed.

Acknowledgements

Professor Satu Pyörälä is appreciated for reading the manuscript critically and for providing excellent comments.

References

Anonymous: Mikrobilääkeaineiden käyttö eläimillä (Usage of antimicrobial medicines for animals). Report, Ministry of Agriculture and Forestry, Helsinki, Finland 1996a, 32 pp.

Anonymous: Käyttöesimerkit mikrobilääkityksistä eläinten tärkeimpiin tulehdus- ja tartuntatauteihin (Usage of antimicrobial agents for the most common infectious diseases in animals). Report,

Ministry of Agriculture and Forestry, Helsinki, Finland 1996b, 29 pp.

Anonymous: Animal diseases in Finland 1997. Report, Veterinary and Food Department of the Ministry of Agriculture and Forestry and National Veterinary and Food Research Institute, Helsinki, Finland 1998a, 39 pp.

Anonymous: Control of foodstuffs of animal origin in Finland. Report, Veterinary and Food Department of the Ministry of Agriculture and Forestry, and National Veterinary and Food Research Institute, Helsinki, Finland 1998b, 23 pp.

Anonymous: Prudent use of antibiotics: global basic principles. Pamphlet, WVA (World Veterinary Association), IFAP (International Federation of Agricultural Producers), and COMISA (World Federation of the Animal Health Industry) 1999, 4 pp.

Baker KB, Chandler EA, Evans GRE, Tyson JD, Miller DJS, Baird JH: General guidelines on the use of antimicrobials. Vet. Rec. 1998, Nov. 14, 565-566.

Björnerot L, Franklin A, Tysen E: Usage of antibacterial and antiparasitic drugs in animals in Sweden between 1988 and 1993. Vet. Rec. 1996, *139,* 282-286.

Blaha T: Gesundheits- und Umweltrisiken nach Anwendung von Antiinfektiva und Antiparasitika in der Nutztierhaltung – Vermeidungsstrategien und Auswege (Health and environmental risks after the use of anti-infective agents and antiparasitic agents in domestic animal husbandry-avoidance strategies and ways out) Dtsch. tierärztl. Wschr. 1996, *103,* 278-280.

Blaha T: Public health and pork: pre-harvest food safety and slaughter perspectives. Rev. sci. tech. Off. Int. Epiz. 1997, *16,* 489-495.

Blaha T: Epidemiology and quality assurance application to food safety. Prev. Vet. Med. 1999, *39,* 81-92.

Blocks GHM, Vernooy JCM, Verheijden JHM: Integrated quality control project: relationships between pathological findings detected at the slaughterhouse and information gathered in a veterinary health scheme at pig farms. Vet. Quarterly 1994, *16,* 123-127.

Debeuckelaere W, Remy R: Research on the presence of antibiotic residues in meat originating from the fifteen E.U. member states. Report prepared on behalf on the European Commission, Contract No B5-1050/95/000130, 1996, 28 pp.

Dunlop RH, McEwen SA, Meek AH, Black WD, Clarke RC, Friendship RM: Individual and group antimicrobial usage rates on 34 farrow-to-finish swine farms in Ontario, Canada. Prev. Vet. Med. 1998a, *34,* 247-264.

Dunlop RH, McEwen SA, Meek AH, Friendship RA, Clarke RC, Black WD: Antimicrobial drug use and related management practices among Ontario swine producers. Can. Vet. J. 1998b, *39,* 87-96.

Elbers ARW: The use of slaughterhouse information in monitoring systems for herd health control in pigs. Thesis, University of Utrecht 1991, 152 pp.

Elbers AR, Cromwijk WA, Hunneman WA, Tielen MJ: Logboekregistratie op vleesvarkensbedrijven in het Integrale Keten Beheersing (IKB) project. (Log book registration of farms for slaughtering pigs in the Integrated Quality Control Project. I. Use of drugs and vaccines). Tijdschr. Diergeneeskd. 1990, *115,* 249-261.

Elbers ARW, Tielen MJM, Cromwijk WAJ, v/d Voorst PH, Bais JT, Verhaegh G, de Bruyn AA: Logboekregistratie op vleesvarkensbedrijven in het project Integrale Keten Beheersing (IKB). II. Medicijngebruik in relatie tot klinische waarnemingen, bedrijfsomstandigheden en de prevalentie van slachtbevindingen. (Logbook recording on pig finishing farms as part of an integrated quality control project. II. Drug use in relation to clinical findings, farm conditions and the prevalence of lesions at slaughter). Tijdschr. Diergeneeskd. 1992, *117,* 41-48.

Espinasse J: Responsible use of antimicrobials in veterinary medicine: perspectives in France. (Review). Vet. Microbiol. 1993, *35,* 289-301.

Heinonen M, Palander S, Tuovinen V: Diseases and medications in finishing units buying health class feeder pigs. Proceedings of the 9th International Congress in Animal Hygiene, 17-21 August 1997, Helsinki, Finland, 242-245. (Abstr.)

Holmgren N, Franklin A, Wallgren P, Bergström G, Martinsson K, Rabe J: SVS-utredning. Riktlinjer för antibiotikainblandning I foder till svin (In-feed medication with antibiotics). Svensk Veterinärtidning 1990, *10,* 407-413.

Kunesh JP, Zimmerman DR: In-feed antibiotics. In and age of microbial resistance and quality assurance, are they still a good idea? Large Animal Veterinarian 1994, *49,* 9-12.

Noordhuizen JPTM, Frankena K: Epidemiology and quality assurance: applications at farm level. Prev. Vet. Med. 1999, *39,* 93-110.

Pearce GP: Epidemiology of enteric disease in

grower-finisher pigs: a postal survey of pig producers in England. Vet. Rec. 1999, *144,* 338-342.

Pedersen KB: Behovet for en veterinaer antibiotikapolitik (The need for a veterinary antibiotic policy). Dansk VetTidsskrift 1997, *80,* 118-120.

Tuovinen VK, Heinonen M: Diminishing the need of antibiotics in pork production. Proceedings of the 9th International Congress in Animal Hygiene, 17-21 August 1997a, Helsinki, Finland, 262-265. (Abstr.)

Tuovinen VK, Heinonen M, Suutari E: LSO 2000 quality chain produces non-medicated pork. Proceedings of the 9th International Congress in Animal Hygiene, 17-21 August 1997b, Helsinki, Finland, 180-183. (Abstr.)

Walton JR: Antibiotics, animals, meat and milk (Review). Zbl. Vet. Med. A 1983, *30,* 81-92.

Walton JR: Selection of antibiotics for use in pig practice. Vet. Rec. 1984, *115,* 520-522.

Van Dresser WR, Wilcke JR: Drug residues in food animals. J. Am. Vet. Med. Assoc. 1989, *194,* 1700-1710.

Witte W: Medical consequences of antibiotic use in agriculture. Science 1998, *279,* 996-997.

Sammanfattning

En deskriptiv studie av diagnoser och behandlingar i specialiserade slaktsvinbesättningar i Finland.

Denna studie beskriver uppföljningen av sjukdomar som registrerats och behandlats hos svin i slaktbesättningar uppfödda utan tillväxtantibiotika. Besättningspartierna sköttes enligt "all in - all out" principen, hörde till hälsoklassen LSO 2000, och svinskötseln bedrevs under definierade förhållanden. Förmedlingsgrisarna införskaffades från besättningar kategoriserade enligt deras hälsostatus. Förekomsten av sjukdomar bokfördes av besättningens ägare i samarbete med en veterinär. I studien granskades 595 besättningspartiers bokföring av sjukdomsfall registrerade mellan mars 1996 och december 1997. Resultaten visar att 91% av svinen inte fick någon medicinsk behandling under uppfödningstiden. 4% av besättningspartierna undergick antimikrobiell massmedicinering (p.o.). En lokal veterinär som i medeltal besökte besättningspartierna 2.6 gånger per uppfödningstid ansvarade för över hälften av diagnoserna. Granskningen av de bokförda sjukdomsfallen visar att i mera än hälften av partierna minst en gris per besättningsparti led av ledinflammation eller svansbitning. I en tredje del av besättningspartierna förekom minst en gris som led av en lokomotorisk sjukdom. Övriga diagnoser påträffades i mindre än 13% av besättningspartierna. En liten del av grisarna undergick individuell behandling. 8% av svinen behandlades med mikrobläkemedel. Allmänt använda antibiotika var ß-lactamantibiotika, tetracyclin och representanter för linkosamid-gruppen, makrolider och pleuromutiliner. Trimetoprim-sulfa, enrofloxacin och en kombination av flera antibiotika användes sällan. Endast 0.7 % av svinen behandlades med andra läkemedel än antibiotika. De flesta av dessa grisar behandlades med anti-inflammatoriska läkemedel. Diagnosen fattades åtminstone för en gris i 29% av partierna samt läkemedel för 8% av behandlingarna. Denna undersökning visar att det är möjligt att uppföda slaktsvin med ett lågt behov av medicinering. Eftersom infektiösa sjukdomar som drabbade hela besättningspartierna var sällsynta var behovet av massmedicinering litet. De oftast diagnosticerade sjukdomarna drabbade endast en liten del av svinen och en individuell medicinering kunde tillämpas. Rekommendationerna för bruket av antibiotika har efterföljts rätt väl. Ägaren och veterinärer borde få mera utbildning för att begripa viktigheten att bevisa för kunden all läkemedelanvändning på besättningen i behov.

(Accecpted March 22, 2001).

Reprints may be obtained from: M. Heinonen, University of Helsinki, Pohjoinen pikatie 800, FIN-04920 Saarentaus, Finland. E-mail: mlheinon@mappi.helsinki.fi, tel: +358-19-5295 310 or +358-400-687 915, fax: +358-19-6851 181.